

Remarks

This Preliminary Amendment is being filed along with an RCE to continue prosecution of the present application. To further the prosecution of the present application, amendments have been made in the claims, and the claims as presented are believed to be in allowable condition.

A complete response to the issues raised in the final Office Action of May 22, 2003 is provided in the response filed on July 1, 2003, which is incorporated herein by reference. For the sake of brevity, all of the arguments presented therein are not repeated below.

The undersigned thanks Examiner Pollack for the courtesies extended in granting and conducting telephone interviews on August 20 and 26. The substance of those interviews is summarized below.

1. Formality Issues

During the telephone interviews, Applicants sought clarification of whether any rejection under §102 over Lambrecht was maintained in the final Office Action, in view of the ambiguity pointed out in the proposed telephone interview agenda submitted on August 19, 2003. The Examiner indicated that no such rejection has been maintained, such that the only rejection in the final Office Action is over Grun.

2. Overview of the Invention

One aspect of the present invention relates to the use of out of band commands in multi-path computer systems. An example of a multi-path system is shown in Fig. 12 of Applicants' specification. In the multi-path system of Fig. 12, multiple physical paths P1-P4 are provided between a host computer 101 and a storage system. Multi-path systems can be advantageous, in that multiple communications can be processed simultaneously between the host computer and the storage system. (page 30, lines 11-12). In addition, in some multi-path systems, load balancing techniques can be employed to select appropriate physical paths for performing communications to increase system performance. (page 30, lines 29-31).

As described in Applicants' specification from page 32, line 22 – page 33, line 6, an out of band control command is distinguishable from in-band communications which pass through the normal read/write path of the system. Out of band commands bypass one or more layers in the normal read/write data path, and can be associated with control functions or the reading and writing of data outside of the normal read/write path. As made clear in the specification:

as used herein, the term “out of band control command” refers to any control command outside of the normal read/write path of the system, which can include commands that implement control functions, as well as those that perform read or write operations outside of the normal read/write path.

Out of band control commands are path-specific operations, and typically will identify a particular one of the multiple physical paths P1-P4 over which the communication is to take place. (page 27, lines 10-14). Conventional multi-path systems can process out of band control commands only over the particular target path specified. (page 28, lines 22-25). As a result, the benefits of employing multiple physical paths are not realized in computer systems that employ conventional techniques for processing out of band control commands.

In accordance with one embodiment of the present invention, a method and apparatus is provided that enables a physical path to be selected for transmitting an out of band control command, using a selection criteria that enables the selected path to be other than the target path identified by the out of band control command.

3. Amendments Have Been Made in the Claims to Clarify
Issues Raised by the Examiner

During the telephone interviews, the undersigned and the Examiner discussed the fact that the rejection over Grun made clear that the Examiner was reading the phrase “out of band control command” as being so broad that it could be read upon commands transmitted over different physical paths extending between a host computer and a device (e.g., a storage system) in a multi-path system. The undersigned explained that that was not a proper interpretation of the claim.

As discussed in the specification, an out of band control command refers to any control command outside of the normal read/write path of the system. (Specification at page 33, lines 3-5). The reference to the normal read/write path of the system does not refer to one or more physical paths that extend between a host computer and device in a multi-path system, but rather, refers to commands “which bypass one or more of the layers in the normal read/write data path” (specification at page 32, line 25). Thus, as discussed during the interview, the reference to the normal read/write path refers to logical layers within a host computer, and not to physical paths connecting a host computer to another device such as a storage system. In this respect, out of band control commands can be executed even in a host computer that employs only a single physical path to another device.

During the telephone interview, the Examiner indicated that he appreciated the foregoing explanation, as he had not fully appreciated that the reference to the normal read/write path related to different logical layers, rather than to physical paths. The Examiner requested that the undersigned consider some amendments to the claims to clarify this distinction.

Thus, Applicants have amended the claims in two ways. First, the reference to multiple paths coupling the host computer to the device have been amended to clarify that the paths are physical paths. Second, the reference to the out of band control command has been amended to clarify that the command is one that bypasses at least one layer in the normal read/write path of the system. In view of those amendments, Applicants respectfully assert that the reference to an out of band control command bypassing a layer in the normal read/write path cannot be read upon Grun or any other prior art reference of record that simply relates to a multi-path system wherein commands are transmitted over different physical paths.

4. The Claims Are Limited To An Out of Band Control Command That Identifies A Target Address

During the telephone interview, the undersigned asked the Examiner to clarify a comment made in the final Office Action (see ¶6) that certain features argued were not recited in the rejected claims. The Examiner asserted that the claims did not recite the

out of band control commands as being “path-specific” and identifying a particular path over which they were to be executed. The undersigned pointed out to the Examiner that each of the claims specifically recited the out of band control command as “identifying, from among the multiple paths, a target path for transmission of the out of band control command between the host computer and the device.” Thus, it is respectfully asserted that each of the claims does recite a method of selecting (or a controller that selects) a physical path for transmitting the out of band control command from among multiple physical paths based upon a selection criteria that enables the selected physical path to be other than the target physical path identified by the out of band control command. Thus, each of the claims recites the handling of an out of band control command in a manner wherein the command is not limited to being transmitted over the target physical path identified in the command itself.

5. The Claims Clearly Distinguish Over Grun

Grun does not relate at all to the processing of out of band control commands. As should be clear from the discussion above, and from the clarifying amendments made to the independent claims, the transmission of in-band commands over different physical paths does not disclose anything in connection with an out of band control command that bypasses at least one layer in a normal read/write path in the system.

In addition, each of the claims recites the processing of an out of band control command that identifies a target physical path for transmission, and the selection of a physical path for transmitting the command based upon a selection criteria that enables the selected path to be other than the target physical path identified in the command. This feature of the claims is simply not taught or suggested by Grun.

In view of the foregoing, it is respectfully asserted that each of the claims patentably distinguishes over Grun, so that the application is in allowable condition.

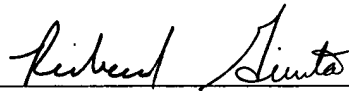
CONCLUSION

In view of the foregoing amendments and remarks, this application is believed to be in condition for allowance. A notice to this effect is respectfully requested. If, after reviewing this response the Examiner believes that the application is not in condition for allowance, he is requested to call the undersigned at the number listed below to schedule a telephone conference to discuss any outstanding issues relating to the allowability of the application.

Respectfully submitted,

Fred Oliveira et al., Applicants

By:



Richard F. Giunta, Reg. No. 36,149
Wolf, Greenfield & Sacks, P.C.
600 Atlantic Avenue
Boston, Massachusetts 02210-2211
Tel. No.: (617) 720-3500
Attorneys for Applicant(s)

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